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AUTHOR McDonald, Janet L.
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ABSTRACT

The development of a two week summer institute for seventh and eighth grade students who are gifted in math and science and are interested in computers is summarized, and various project materials are appended. Objectives of the 1982 microcomputer summer institute, which was sponsored by the State University of New York at Albany, included: providing microcomputer experience for students; teacher training; instructional material development; and collection of data for research in the areas of talented/gifted students, problem solving, and microcomputers. Information is presented on the following program components: selection and preparation of teachers, selection and development of instructional materials, selection of students, conducting the two week instructional institute, the collection of student data, a university fall (followup) course for teachers involved in the institute, and dissemination of teacher produced activity guides and software, as well as reports and papers on the institute. The instructional modules that were developed by the teachers are briefly described. Appended materials include: a list of about 46 references, materials for the selection of prospective teachers, a list of course goals and assignments for the teachers, student selection materials, and summer institute materials. Among these materials are the following: a rating scale for evaluating prospective students for the summer institute, a computer entry exam, and guidelines and forms for rating student performance. (SEW)

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MICROS, PROBLEM SOLVING AND GIFTED KIDS: AN EXCITING COMBINATION

A Report of the 1982 State University of New York at Albany
Microcomputer Summer Institute for Talented/Gifted
Middle School Students in Mathematics and Science

Janet L. McDonald
State University of New York at Albany

Prepared for the Proceedings of the National Conference on the
Use of Microcomputers in Special Education
Michael Behrmann and Liz Lahm, Editors

ERIC Clearinghouse on Handicapped & Gifted Children
1920 Association Drive, Reston, VA 22091

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1. Overall Design and Purpose:

In the fall of 1981 a decision was made at the State University of New York at Albany (SUNYA) to design and implement a plan for a two week intensive summer microcomputer institute for talented and gifted middle school students. The institute was to be a combined effort of the School of Education, the Department of Teacher Education, the College of Continuing Studies and the Institute for School Development. The College of Continuing Studies had been involved, for several semesters, in a continuing series of programs aimed at this population. The remaining three groups had coordinated two previous intensive summer microcomputer institutes, but for a population of teachers.

There were several purposes and perceived directions of the program beyond a desire to provide a two week microcomputer "experience" for students. The purposes included those of teacher training, the development of instructional materials and the collection of data for research in the areas of talented/gifted, problem solving and microcomputers.

Previous institutes at SUNYA with teachers had served to [illegible] an intense interest among teachers of mathematics and science in learning more about all aspects of teaching with, and about microcomputers. As such, a model was developed which would incorporate a sequence of three graduate courses (9-semester hours) in which prospective institute teachers would design curricula and prepare materials for the summer program. In this way, the teachers involved with the program would gain further experience in curriculum and program development, the development of computer-based instructional materials, a familiarity with the literature and teaching of the talented and gifted as well as further experiences teaching with

microcomputers. Since there is currently an extremely limited amount of high quality software available for use with talented students, an additional purpose of the program was the creation of a package of instructional materials which could be made available to other teachers for use with their own students.

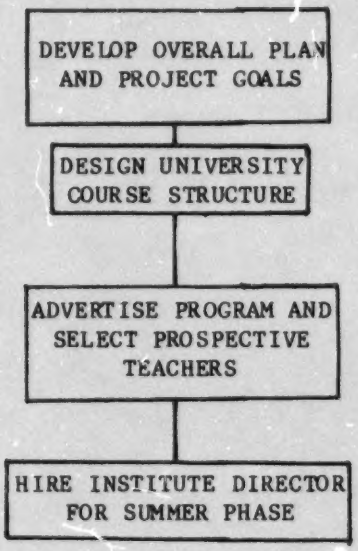
A survey of similar programs for gifted students at other schools and universities showed that most programs tended to emphasize instruction in the BASIC programming language. Although some instruction in programming would be a component of the institute, a decision was made to emphasize problem solving in mathematics and science, rather than programming alone. This decision was made so that the insititute might serve to show students the great capacity of the microcomputer as a problem solving, timesaving tool. Although it was assumed that students would learn more about programming as a result of the institute, the instruction was designed to de-emphasize instruction in the syntax of the BASIC language and to emphasize the unique capabilities of computers to solve problems.

A final purpose of the institute was to provide a vehicle for the collection of data related to talented students, their problem solving abilities and the interaction with microcomputer-based instruction. Since little data has been collected in this area, several data collection techniques and efforts were incorporated into the design. Students were videotaped while solving problems at the computer, teachers collected time-on-task data and also kept anecdotal records on each student. Students also participated in group and individual testing on standardized aptitude tests as well as cognitive development tasks.

II. Design Model for the Microcomputer Institute:

The basic design of the program is shown in the diagrams which follow throughout the remainder of this document. They depict the five phases of the program: 1) Initial Planning, Fall 1981 2) University Course for Teachers, Spring, 1982 3) Two Week Instruction, Summer, 1982 4) University Course for Teachers, Fall, 1982 and 5) Evaluation and Reporting, Spring, 1983. Following each diagram are further details of each of the component phases.

Phase 1 - Initial Planning, Fall 1981

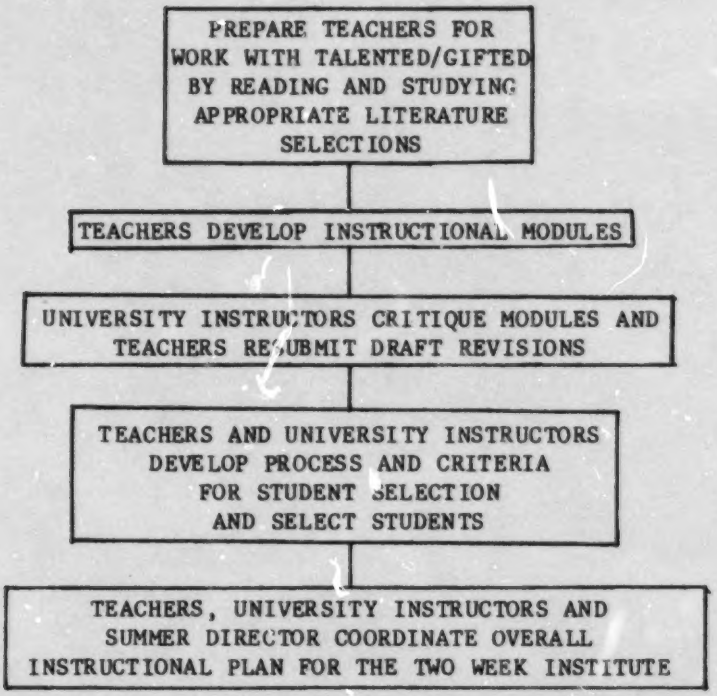

DEVELOP OVERALL PLAN AND PROJECT GOALS
DESIGN UNIVERSITY COURSE STRUCTURE
ADVERTISE PROGRAM AND SELECT PROSPECTIVE TEACHERS
HIRE INSTITUTE DIRECTOR FOR SUMMER PHASE

III. Selection and Preparation of Teachers:

The process for the selection of prospective teachers for the summer institute began with an interest meeting in December, 1982 (see Appendix A for publicity forms and information). Fifteen teachers attended the initial meeting and nine teachers were eventually selected and enrolled in the three

course sequence. Of these nine, six completed the sequence; five mathematics teachers and one science teacher. Each of these teachers had had extensive experience with the classroom use of microcomputers as well as having completed one or more university courses on the instructional use of microcomputers. Each teacher had also had a minumum of five years teaching experience.

Phase 2 - Spring 1982
University Course for Teachers


PREPARE TEACHERS FOR WORK WITH TALENTED/GIFTED BY READING AND STUDYING APPROPRIATE LITERATURE SELECTIONS
TEACHERS DEVELOP INSTRUCTIONAL MODULES
UNIVERSITY INSTRUCTORS CRITIQUE MODULES AND TEACHERS RESUBMIT DRAFT REVISIONS
TEACHERS AND UNIVERSITY INSTRUCTORS DEVELOP PROCESS AND CRITERIA FOR STUDENT SELECTION AND SELECT STUDENTS
TEACHERS, UNIVERSITY INSTRUCTORS AND SUMMER DIRECTOR COORDINATE OVERALL INSTRUCTIONAL PLAN FOR THE TWO WEEK INSTITUTE

The fall course, E TCH 637R- Mathematics/Science via Micros for High Achievers, was designed and taught by Dr. Margaret A. Farrell, Mathematics Educator and Chair of the Department of Teacher Education, and Dr. Jan McDonald, Mathematics and Computer Educator within the department. The course

was structured with two major purposes in mind: to familiarize the teachers with the literature and research on talented and gifted students and to create instructional materials which would form the core of the instructional sequence for the summer institute. The course included selected readings and discussion in the areas of talented/gifted, problem solving, mathematics education, cognitive development, data collection techniques and microcomputer instructional design and implementation. As course assignments the teachers read and abstracted articles on gifted children, mathematics instruction and microcomputers. The teachers also designed and wrote initial and revised drafts of individual software modules which they planned to use during the summer instruction of the students (see Appendix B for course objectives and assignments).

IV. Selection and Production of Instructional Materials:

The teachers were given several parameters for determining their individual instructional topic for the summer. First of all, the topics were to be enrichment rather than acceleration activities. In other words, the topics covered were not to be drawn from the normal mathematics and science curricula. This decision was made in an effort to avoid interference with the individual schools' programs for the students and with the intention of broadening the students' mathematical and scientific experiences. Teachers were required to choose topics which involved problem solving in either mathematics or science and which involved patterns, hypothesis formation and testing and which demonstrated the microcomputer's unique strengths and abilities such as iteration, speed and flexibility. Teachers were also encouraged to design instructional modules which would distinguish between algorithmic and heuristic programming in problem solutions.

The teachers were asked to incorporate into their plans, problems and experiences which could be used to examine students' abilities to generalize, recognize patterns, form conjectures, curtail (find short-cuts), establish reverse associations, design flexible and unique applications and approaches. They were also asked to include project "extensions" which could be recommended to students interested in further work on the same general topic. The resulting modules involve software developed by the teachers for demonstration and student use as well as problems which students would solve by developing programs of their own.

The instructional modules which were developed by the teachers are described briefly below:

1) Environmental Impact - by Mrs. Candice Bosworth, a middle school science teacher with the Bethlehem School District, Delmar, NY. This module introduces the student to the information necessary to make sound decisions regarding environmental land management. Students learn terms such as water table, land slope, soil ph and wildlife and the impact of those variables on land development. Through the use of an interactive computer simulation, students make land development decisions. Their choices are evaluated by the software. The concept of permutations is presented as a component of the module.

2) Curious Number Patterns - by Miss Donna Blake, a high school mathematics teacher with the Saratoga Springs City School District, Saratoga Springs, NY. Within this module students investigate patterns found in special numbers such as palindromes, perfect, abundant and deficient numbers, happy numbers and friendly numbers. The computer is used to generate or test numbers to see if they fit the patterns. The algorithms to generate the

numbers are presented as well as information related to the historical significance of each.

3) The Game of Life - by Mrs. Sheila Dolgowich, a high school mathematics and computer teacher and the Talented/Gifted Coordinator with the Berne-Knox-Westerlo School District, Berne, NY. This module presents a game devised by John Conway in the early 70's. Students are introduced to the rules of the game and are given examples to plot on grid paper. The results of simple configurations which either vanish, become stable or repeat are presented. Students investigate multiple configurations and make predictions and identify patterns which emerge using a computer simulation.

4) Artificial Intelligence - by Mrs. Mary Ann Foster, a high school mathematics and computer mathematics teacher with the Greater Johnstown School District, Johnstown, NY. Within this module the student is introduced to machine intelligence, robotics and heuristic programming. Instructional topics include readings and discussion of artificial intelligence and experience with the game Animals and the game Hexapawn. Students are provided with software capable of playing the above games and are involved in activities through which they are shown how the computer is capable of simulating learning experiences.

5) Spirolaterals - by Miss Phyllis Yudikaitis, a junior high mathematics teacher and computer coordinator with the Shenendehowa Central Schools, Clifton Park, NY. This module employs the computer as a tool to generate graphic "spirolaterals" (cycling paths). The student examines spirolaterals looking for various patterns and is asked to generalize findings and test hypotheses by using two graphics programs.

6) Number Expansions and Remainders - by Mr. David VanSchaick, a junior high mathematics teacher and computer coordinator with the Shenendehowa Central Schools, Clifton Park, NY. The student is provided with a series of problems dealing with an analysis of the division process and the recovery of remainders. Students design programs to convert to different number bases and analyze rational numbers for repetition and termination. These techniques are then applied to convergent series and approximations of pi.

Specific details of the instructional modules will not be made here, but are available in a monograph entitled Enrichment Activities with Microcomputers in Mathematics and Science for Academically Talented Middle School Students. This document includes detailed daily plans for each of the modules and a disk for the Apple II microcomputer containing instructional software and sample student programs. These materials are available on a cost-of-production basis from:

The Institute for School Development
State University of New York at Albany
Husted 211- Attn: Dr. Nelson Armlin
135 Western Avenue, Albany, NY 12222

Each module contains a list of prerequisite skills of students, instructional objectives, implementation plans, student worksheets, references and other support materials.

V. Process and Criteria for Selection of Students:

Student selection was based on several criteria. Students were required to demonstrate high achievement in mathematics and science, strong task committment, high motivation and minimum competence in BASIC programming. Because of limited facilities at the University, students were required to

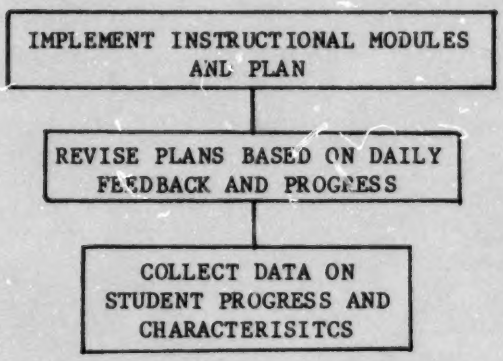
bring a microcomputer system for their own use throughout the institute. In most cases the system was provided by the student's school district. In some cases the students brought their own personal microcomputer from home. To assure that students would have the prerequisite skills for the instructional modules, it was additionally required that students had completed seventh grade mathematics (but not necessarily seventh grade). Several instruments were utilized to determine the above criteria (see Appendix C for the instruments which will be described below).

Schools were requested to provide school grades in Mathematics, English, Social Studies and Science as well test scores on any standardized achievement and/or aptitude tests. In addition, the mathematics and science teachers of each student were asked to complete two student rating scales. The first rating scale (Scale A, Appendix C) dealt with the student's motivation and task committment. The second scale (Scale B) emphasized the student's general problem solving abilities and academic potential. These scales were adaptations of Renzulli (1979) scales. Student applicants were then adminsitered a pre-test on BASIC programming skills. This test was designed to measure the student's proficiency with LET, PRINT, INPUT, GOTO, IF...THEN, FOR...NEXT, and READ...DATA statements, memory storage, looping procedures and program writing. Students who wished to participate and who met all other criteria, but were unable to demonstrate minimum competency on the computer examination were allowed to demonstrate competency by the completion of one of several area instructional programs prior to the August institute.

Thirty students were selected on the basis of their combined scores on each of the criteria. The number of students was determined on the basis of the room size available for the institute and with the desire of maintaining a

reasonably high teacher-to-student ratio. The students who participated represented a variety of school districts from within the Capital District area. Although the original design included an attempt to have a 50-50 split of males and females, a much higher proportion of males indicated an interest and met the qualifications. The participants included six females and twenty-four males from grades five through eight. Two fifth graders who were originally selected participated in Julian Stanley's summer program instead. They were replaced by the top two students on the waiting list of 37 additional students. The range of ages of the participants was 11 years 0 months to 14 years 6 months.

Phase 3 - Two Week Intensive Institute
Summer 1982


IMPLEMENT INSTRUCTIONAL MODULES AND PLAN
REVISE PLANS BASED ON DAILY FEEDBACK AND PROGRESS
COLLECT DATA ON STUDENT PROGRESS AND CHARACTERISITCS

VI. Microcomputer Institute:

The summer phase of the model was directed by Dr. Joseph R. Kelly, Center for Instructional Development, Old Dominion University, Norfolk, Virginia. Dr. Kelly, a science and mathematics educator with considerable microcomputer experience, was in charge of the day-to-day instructional activities and

general coordination of the program and teachers. Dr.'s Margaret Farrell, Walter Farmer, Arnulfo Ramirez, and Janet McDonald coordinated and participated in the student data collection and research component of the summer phase. The following description of the summer phase is abstracted from Dr. Kelly's report of the Problem-Solving Insitute.

In the week preceding the two-week institute, the six teachers met with Dr. Kelly in daily meetings of 3-4 hours duration. During that week the instructional team outlined the specific details of the instructional plan, set up the physical organization for student computer stations, presented "trial runs" of the instructional modules to the other instructors to check pacing, equipment needs, etc. and to get feedback from other instructors, adopted policies and procedures for daily operation (see Appendix D) and studied student folders to anticipate individual student needs and behaviors. The teachers also planned and conducted an introductory session and picnic on the Sunday before the institute began. This day also included equipment set-up and general information for both students and parents.

An overview of the two-week schedule is provided in Appendix D. The instructional model was based upon the Renzulli Enrichment Triad Model (1977). Daily activities included presentations of initial problems by the instructors followed by discussion and independent and group work involving the solution of posed problems. Students were alternately involved in group training activities, general exploratory activities and individual and small group investigations. "Spin-off" problems were also posed to students for further exploration. The microcomputer systems which were used by the students included Apples, TRS-80s, PETs, VIC-20's and ATARIs, with the majority of the machines being Apples. To facilitate instructor assistance,

the three instructors who were most familiar with Apples spent the majority of their time in the front part of the room, where the Apples were located, while the remaining four instructors worked with the students near the back of the room with the other machine types.

At the end of each day, institute staff met for approxiamtely one hour to summarize progress and problems of the day, alter the next day's instruction based on progress and feedback, and express concerns regarding individual participants and suggest appropriate actions. Specific problems which were noted and addressed included weak programming ability of some students, knowledge "gaps" for several students in programming and/or mathematical skills, task committment of some students, persistent "game playing" and software piracy by some students (despite a general ban on such activities), difficulty of teachers in managing observations as well as helping individual students, resistance of some students to work in pairs or small groups when requested, resistance of most students to planning work on paper prior to working with the computer, inability of several students to cope with a lack of structured time and/or long time periods and a wide range of programming and problem solving abilities.

VI. Collection of Student Data:

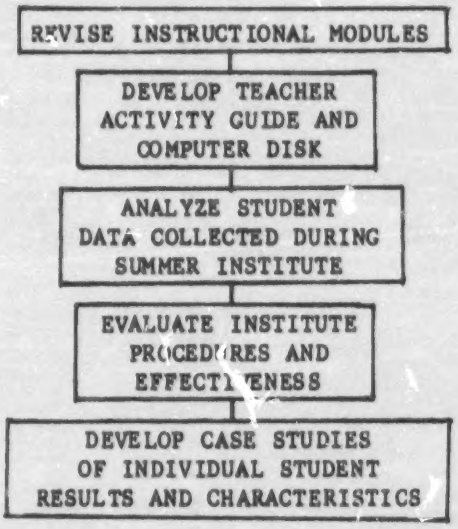
Several ethnographic data collection procedures were utilized throughout the institute. These included video-taping, student self-reports and teacher observations. Using data collection materials specifically designed for each instructional module, data were collected on students' abilities to find and generalize patterns, generate and test hypotheses, as well as their flexibility in problem solving strategies with the microcomputer. Teachers also noted the roles which individual students assumed in structured and

unstructured group work (see Appendix E for data collection instruments). A folder of collected data was generated for each participant.

During daily "draw-off" sessions from the lunch hour, student participants were also administered several other instruments. Students were given the Henman-Nelson Test of Mental Ability (Grade 9-12 version to avoid a ceiling effect), a ratio and proportion task "Mr. Tall - Mr. Short" (Karplus et al., 1977), the Test of Logical Thinking (TOLT), (Tobin & Capie, 1981), the Longeot Test (Longeot, 1964), and the Projection of Shadows Task (Inhelder & Piaget, 1958). Each of these last instruments is designed to measure the student's formal operational reasoning ability. Students were also administered a self-perception scale related to their microcomputer use, an exit programming examination which paralleled the entry exam and an institute interest and evaluation form (see Appendix E).

VI. Phase 4 - University Course - "Follow-up":

In the fall of 1982, teachers were enrolled in the final course of the three course sequence, with Dr. Jan McDonald as the instructor. The major components of the course are outlined below:


REVISE INSTRUCTIONAL MODULES
DEVELOP TEACHER ACTIVITY GUIDE AND COMPUTER DISK
ANALYZE STUDENT DATA COLLECTED DURING SUMMER INSTITUTE
EVALUATE INSTITUTE PROCEDURES AND EFFECTIVENESS
DEVELOP CASE STUDIES OF INDIVIDUAL STUDENT RESULTS AND CHARACTERISTICS

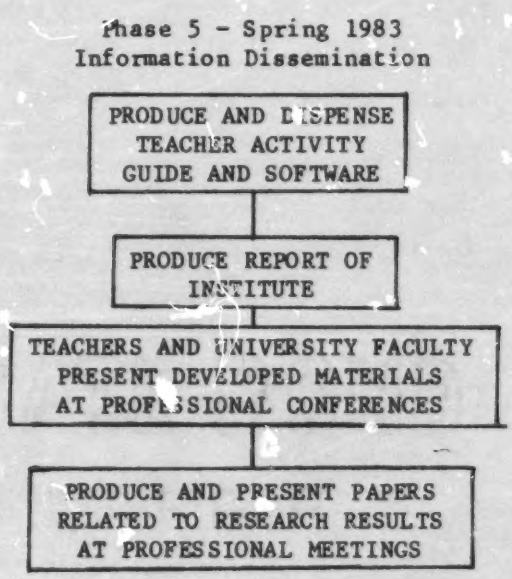
The teachers were instructed in the use of a common microcomputer word processing package and each teacher entered their instructional module onto a disk. Subsequent revisions throughout the semester were made using the editing features of the software. The resulting product, listed previously, was produced and made available to interested teachers. The data analysis which was performed, as well as the individual case studies, are reported in the research papers which will be noted below.

Teachers and university personnel completed the analysis of the student data. The mean intelligence quotient on the Henmon-Nelson was 136.5. This included one low score of 104. With the elimination of that particular score, the mean score of the remaining 29 students was 137.7. The results of the ratio puzzle indicated 37% of the students to be formal operational at that task. Results of the TOLT, Longeot and Shadows Task were 80%, 100% and 27% formal operational, respectively. Each of these results indicated capabilities well beyond most high school students. Additional descriptions and discussion of these results can be found in "Cognitive Development of Gifted Middle School Students", a paper presented by Dr. Walter A. Farmer at the annual meeting of the Association for the Education of Teachers in Science, Fairleigh Dickenson University, May, 1983.

At the end of the insititute, each teacher involved in the program rank ordered the participants with respect to their problem-solving abilities. These rank orderings were combined to produce a composite rank ordered list. These rank orders and results on various other tasks were compared to student data including the results of the student self-perception scale. The results of these data can be found in "Student and Teacher Perceptions of Problem Solving Abilities with Microcomputers" a paper presented by Dr. Jan McDonald

at the annual meeting of the Association for the Education of Teachers in Science, Fairleigh Dickenson University, May, 1983. Other papers involving related data, presented at the same meeting include "Metacognitive Analyses of Language Strategies Used in Problem Solving" by Dr. Arnulfo G. Ramirez and "Cognitive Processes in Mathematics and Science: Task, Subject and Instruction Variables", by Dr. Margaret A. Farrell.

VII. Information Dissemination:


Phase 5 - Spring 1983
Information Dissemination
PRODUCE AND DISPENSE TEACHER ACTIVITY GUIDE AND SOFTWARE
PRODUCE REPORT OF INSTITUTE
TEACHERS AND UNIVERSITY FACULTY PRESENT DEVELOPED MATERIALS AT PROFESSIONAL CONFERENCES
PRODUCE AND PRESENT PAPERS RELATED TO RESEARCH RESULTS AT PROFESSIONAL MEETINGS

This document, as well as those previously referenced, represent the final phase of the instructional model. It is the hope of all who were involved in the institute that the model provide a useful structure for others who wish to implement similar instructional programs. The author wishes to thank the many individuals who made the institute a success, including Nels Armlin, Walt Farmer, Marge Farrell, Catherine Gibson, Joe Kelly Arnulfo Ramirez, the

individual school districts, teachers and students. In particular, the author would like to acknowledge the superior effort, products and teaching of each of the teachers involved in the project: Donna Blake, Candy Bosworth, Sheila Dolgowich, Mary Ann Foster, Dave VanSchaick and Phyllis Yudikaitis.

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APPENDIX A

MATERIALS FOR THE SELECTION OF PROSPECTIVE TEACHERS

CASDAGRAM

CAPITAL AREA SCHOOL DEVELOPMENT ASSOCIATION
STATE UNIVERSITY OF NEW YORK AT ALBANY
135 WESTERN AVENUE—HUSTED 211
ALBANY, NEW YORK 12222
PHONE 518 455-6281

This copy for Math and Science Department Chairmen

TO: Principals, Mathematic and Science Department Chairmen

FROM: Nelson Armlin, C.A.S.D.A.; Kathryn Gibson, College of Continuing Studies, SUNY at Albany

DATE: November 20, 1981

RE: Graduate Seminars in the Instructional Use of Microcomputers for Gifted Students (grades 6-10)

A seminar/institute program for mathematics and science teachers on the instructional use of microcomputers for gifted education will be offered in 1982. Innovative curriculum materials will be designed, tested, and evaluated in this three-part graduate program.

Mathematics and science teachers will register for an intensive sequence of courses for up to 9 credits under the direction of Mrs. Jan McDonald, Lecturer, and Dr. Marge Farrell, Chairperson, Department of Teacher Education at the University at Albany. In the spring of 1982, teachers will design curriculum, select and develop software, and plan individual teacher presentations. During the summer of 1982, teams of teachers will implement this new curriculum in a two-week practicum. They will work with gifted students, make presentations, and assist with all aspects of the summer microcomputer institute course under the guidance of the project director. This two-week institute will be a featured part of the SUNYA gifted and talented program. In the fall term, software and curricula will be reviewed, refined, and duplicated as a package to be distributed to all participating teachers. These materials will also be available to other programs and schools, with a view toward publication possibilities.

Teachers interested in applying the nine hours toward an advanced graduate program may wish to investigate the Certificate of Advanced Study degree with the Department of Teacher Education. This degree (60 hours beyond the bachelor's) may be designed to emphasize microcomputers in mathematics or science instruction.

An informational meeting has been scheduled to present this new graduate seminar/institute program to all interested math and science teachers on December 9, at 4:00 p.m. in the CASDA conference room in HUSTED HALL (room 211). Please complete the attached form or call 455-6281 if you are able to attend or if you cannot attend but would like to receive further information.

Name _____

Field (Math) (Science)

School _____

Address _____

_____

Phone _____

_____ I plan to attend the December 9 meeting.

_____ I am unable to attend the December 9 meeting, but would like to receive information about the microcomputer seminar/institute program.

RETURN TO: Capital Area School Development Association
State University of New York at Albany
135 Western Avenue Husted 211
Albany, New York 12222

CASDAGRAM

CAPITAL AREA SCHOOL DEVELOPMENT ASSOCIATION
STATE UNIVERSITY OF NEW YORK AT ALBANY
135 WESTERN AVENUE—HUSTED 211
ALBANY, NEW YORK 12222
PHONE 518 455-6281

There are still places available in the 9 hr. graduate course program on "Instructional Use of Micro Computers with Gifted and Talented Students". The spring course, E TCH 637 R, has been scheduled for Tuesday evenings, 5:15 - 8:05 p.m. in Education 13.

Registration is on Monday, January 25, 1982, from 9:00 a.m. - 6:30 p.m. If you are a non-degree student, be sure to write a letter to Mr. H. Blodgett requesting permission to take this series of courses for professional advancement.

Mr. Hollis Blodgett, Assistant Dean
Graduate Admissions Office
School of Education, ED 239
State University of New York at Albany
1400 Washington Avenue
Albany, N.Y. 12222

The first class meets on Tuesday, January 26, 1982.

If you are interested in enrolling in this program or would like more information, complete the enclosed pre-registration form and call Jan McDonald at 457-8255 or 457-7752. The pre-registration form should be mailed to:

Mrs. Jan McDonald

School of Education, ED B12
State University of New York at Albany
1400 Washington Avenue
Albany, New York 12222

Pre-Registration Form
for
Graduate Seminar Series on Teaching Gifted and Talented Students
Foreign Languages Use of Micro Computers

NAME _____

HOME ADDRESS _____

_____

Home Telephone No: _____

Social Security No. _____

School District _____

Address _____

Telephone No. _____

	College/University	Major
1. Undergraduate Degree	_____	_____
Graduate Degree	_____	_____

2. Number of years teaching experience. _____

3. Name(s) of courses you are teaching:

Name of Course	Level
_____	_____
_____	_____

4. For those applying for the Micro Computer Program, please list your experience with Micro Computers.

_____

_____

_____

5. Reasons for wanting to participate in the seminar program:

_____

_____

_____

6. Other comments:

_____

_____

_____

_____

APPENDIX B

FALL 1982 COURSE
GOALS AND ASSIGNMENTS

ETCH 637R - Mathematics/Science via Micros for High Achievers

I.OBJECTIVES

A. High-achieving Math/Sci. Ss

1. Compare/contrast diverse definitions of "gifted", "academically talented", "over-achievers", or "high-achievers"

2. List the identifying characteristics of those who show promise in mathematics or science.

3. Describe diagnostic measures which the classroom teacher can use with the "gifted".

4. Describe promising instructional strategies to use with the "gifted"

5. Identify major sources (research and non-research) for background work on the "gifted".

6. Identify areas of needed research on the "gifted".

7. Collect data on high-achievers within an acceptable level of reliability by means of paper/pencil instruments, observation guides, and/or stuctured interview.

B. Micro-involved Instruction in Mathematics/ Science

1. Identify major sources for background materials on the use of the microcomputer as an instructional tool.

2. Describe diverse instructional designs for educational software, including the advantages and disadvantages of each approach.

3. List the identifying characteristics of high-quality educational software.

4. Design and program an instructional module involving an enrichment topic in mathematics and/or science.

5. Identify areas of previous and needed research on the use of the microcomputer as an instructional tool.

II. ASSESSMENT

A. Ten abstracts of articles (see directions).

B. Performance on

1. observation scale

2. test instrument(s) scoring

3. structured interview

C. Design of individual presentation of a mathematics/science topic using the microcomputer (see directions).

D. Class participation

DESIGN OF INDIVIDUAL SOFTWARE MODULE

1. Write a general description of the instructional module which you plan to design. Include the specific mathematics/science enrichment topic, the instructional design(s) (drill and practice, tutorial, simulation, instructional game, problem solving, demonstration, informational, etc.), and the overall instructional goals. (Due March 16th)

2. List the specific prerequisite skills which will be required of the students who will utilize this module, and any methods which you intend to use to determine whether or not these are met by the students.

3. Specify the objectives which you would like the students to have met by the end of this instruction.

4. List specific activities which this instruction will require of the student.

5. Outline the basic design of the software module. Identify parts which will require graphics, sound, or other special programming. Identify the intended language and microcomputer, including any special hardware requirements (printer, minimal memory etc.)

6. Describe, in detail, how the module will be implemented as a part of instruction. (#2-#6 Due April 6th)

7. Write, test, and debug the software.

8. Document the software, thoroughly.

9. Develop support materials for the instructional package, including any special instructions for teacher/student use, additional texts, media, hardware, special setups, etc..

10. Design a method of collecting information to re-evaluate and alter programs on the basis of feedback. (#7-#10 Due May 4th)

When designing your programs, be sure to consider:

a) directions and responses to student input need to be clear and concise--use examples wherever appropriate.

b) screen formatting should be optimal

c) involuntary termination of programs

d) motivational aspects including student involvement and control

E TCH 637 R SPRING 1982 M. Farrell
J. McDonald

Abstracts of Articles

Review articles within the last five years on (1) the use of micros to teach mathematics/science and (2) the high achieving middle/shs student, mathematics or science. Choose the ten you consider best to abstract. At least four must deal with the high-achieving students. Your final selection of ten articles must be drawn from at least four different types of journals.

For each article abstracted, hand in:

1. a xerox copy of the article
2. an abstract, typed, on a 5 x 8 card or standard-sized paper including
   a. complete bibliographic data on the article
   b. a short paragraph summarizing the article -- its highlights
   c. a critique of the article in terms of class lectures or other readings

Due dates:

1. At least four abstracts (two on each theme) are due March 2.
2. The remaining abstracts are due on May 4.

APPENDIX C

STUDENT SELECTION MATERIALS

CASDAGRAM

CAPITAL AREA SCHOOL DEVELOPMENT ASSOCIATION
STATE UNIVERSITY OF NEW YORK AT ALBANY
135 WESTERN AVENUE—HUSTED 211
ALBANY, NEW YORK 12222
PHONE 518 455-6281

TO: Building Principal

FROM: Nelson Armlin, Associate Director, CASDA
Kathryn Gibson, Coordinator of Programs for Gifted Students,
College of Continuing Studies

DATE: April 30, 1982

Enclosed are applications and materials describing a two week summer institute for seventh and eighth grade students who are gifted in math and science and who have an interest in computers. The program is one of a series of experiences being offered for gifted students by the School of Education in collaboration with CASDA and the College of Continuing Studies.

We would appreciate your distributing the information and applications to students you believe would qualify and be interested in the program. Please call Nelson Armlin at 455-6281 if you have any questions or require additional applications.

NJA/kd
Enclosure

Problem Solving in Mathematics and Science Using the Micro

This problem solving institute is designed for students who display a keen interest and high achievement in mathematics and science. Thirty applicants will be selected from students who have completed seventh or eighth grade as of June 1982. In addition to high achievement in mathematics and science and superior motivation, students will be expected to possess entry-level skills in programming the BASIC language. Each participant will need to bring a micro to the institute. If a student who is otherwise qualified for the institute does not own a micro, arrangements may be made with local school districts to loan equipment. The University is willing to act as an intermediary in arranging such loans.

During the two week institute, students will be working individually, and in small and large groups on problem solving activities. Under the guidance of one or more of the staff, students will explore topics such as environmental impact, artificial intelligence and number theory. Topics have been chosen to give the student experience with the micro's unique capability as a problem solving tool. Specific attention will be given to themes dealing with iterative procedures, randomness, algorithmics versus heuristic procedures and graphics.

The institute will be directed by Dr. Joseph Kelly, Assistant Director for Faculty Development, Center for Instructional Development, Old Dominion University, Norfolk, Virginia. Other staff members include eight mathematics and science teachers from area junior and senior high schools. All eight have been involved in developmental activities relating to the institute's design, curriculum and screening procedures during the spring semester 1982. They will be directly involved in classroom instruction as well as individual interaction with students.

Classroom sessions will meet each week day, August 2 - 13 from 9 AM - 3 PM. In addition, an orientation day has been planned for August 1.

COST OF PROGRAM: $180.00 Includes cost of tuition, and instructional materials.

$25 DEPOSIT MUST ACCOMPANY APPLICATION. This deposit is not refundable for those students accepted in the Institute and will be applied toward tuition. The balance of tuition is due by June 25.

Checks should be made payable to:
Institute for School Development and mailed to -

Capital Area School Development Association
State University of New York at Albany
Husted Hall Room 211
135 Western Avenue
Albany, NY 12222

For further information call Dr. Nelson Arnlin - CASDA - 455-6281

INSTITUTE FOR SCHOOL DEVELOPMENT
State University of New York at Albany
135 Western Avenue Husted 211
Albany, New York 12222

Application for Summer Program for Gifted Students
Math/Science Institute Using Micro Computers

I. Student Application

Name _____ School District _____

Address _____ School Principal _____

_____ Grade to be completed in June 1982____

Phone: _____

I do _____ do not _____ (check one) have a micro computer to bring to the Institute. Type of computer _____

II. To be completed by Parent

I give permission for the release of _____'s grades
(Name of son or daughter)
and test scores to the Math/Science Institute.

_____ _____
Date Signature of Parent

III. To be completed by School Principal

Most recent Report Card Grades:

Subjects	Grade
Math	_____
English	_____
Social Studies	_____
Science	_____

Academic Achievement Test Scores, if available:

Name of Test	Score	Date of Testing
_____	_____	_____
_____	_____	_____
_____	_____	_____

_____
Signature of Principal

Teacher Rating Forms will be sent from the Institute directly to the teachers.

A SHORT COMPUTER SKILLS TEST WILL BE ADMINISTERED TO APPLICANTS PRIOR TO ACCEPTANCE INTO THE PROGRAM.

S U N Y A
Department of Teacher Education

Rating Scale A

Summer Institute - MATH/SCI

This student has applied for the SUNYA Mathematics/Science Summer Institute in "Problem Solving Strategies with the Micro". Since the institute will involve two weeks of intensive study, it is important that students have the motivation and commitment to profit from the experience. Please fill out the rating scale as carefully as possible. Your rating is confidential and will be available only to the institute staff.

Student Name	School	Grade
Rater's Name	Teacher of What Subject?	

	Not Observed	Seldom or Never	Occasionally	Considerably	Almost Always
1. Needs little external motivation to follow through in work that initially interests her/him.	☐	☐	☐	☐	☐
2. Becomes absorbed and truly involved in certain topics or problems; is persistent in seeking task completion.	☐	☐	☐	☐	☐
3. Is easily bored with routine tasks.	☐	☐	☐	☐	☐
4. Strives toward perfection; is self critical; is not easily satisfied with his/her own speed or products.	☐	☐	☐	☐	☐
5. Prefers to work independently; requires little direction from teachers.	☐	☐	☐	☐	☐
6. Likes to organize and bring structure to things, people, and situations.	☐	☐	☐	☐	☐

S U N Y A
Department of Teacher Education

Rating Scale B — 1982 Summer Institute - MATH/SCI

This student has applied for the SUNYA Mathematics/Science Summer Institute in "Problem Solving Strategies with the Micro." Since the institute program will focus on the content of mathematics and science with emphases on general problem solving strategies, it is important that students have the academic potential to profit from the experience. Please fill out the rating scale below. Your rating is confidential and will be available only to the institute staff.

Student Name _____ School _____ Grade _____

Rater's Name _____ Title of Course _____ Class Size _____

	Not Observed	Seldom or Never	Occasionally	Considerably	Almost Always
1. Has quick mastery and recall of factual information.	☐	☐	☐	☐	☐
2. Shows marked facility with language; uses many words easily and accurately.	☐	☐	☐	☐	☐
3. Tries to discover the how and why of things; asks many provocative questions (as distinct from informational or factual questions); wants to know what makes things (or people) "tick."	☐	☐	☐	☐	☐
4. Is a keen and alert observer; usually "sees more" or "gets more" out of a problem, film, demonstration, etc. than others.	☐	☐	☐	☐	☐
5. Often uses original methods of solving problems; is able to combine ideas and materials in a number of ways; or creates products of unusual character or quality.	☐	☐	☐	☐	☐
6. Is logical; often generalizes or applies understanding in new situations; expands concepts into broader relationships; sees parts in relation to the whole.	☐	☐	☐	☐	☐
7. Enjoys the challenge of difficult problems, assignments, issues, and materials	☐	☐	☐	☐	☐

8. Rank the applicant in terms of the students in his/her math/sci class. _____.

COMPUTER ENTRY EXAM

TO ADMINISTRATORS:

The following test should be administered to the candidate in the presence of a teacher, administrator or guidance counselor.

The candidate should be given the test and several pieces of scrap paper and allowed to work in a quiet place for a period of time not to exceed one hour.

Calculators, computers, textbook materials and manuals should not be used by the student during the examination.

Work may be completed in pen or pencil.

All work, including scrap paper, should be returned to the university in the envelope provided. Please be sure that the student's name appears on all pages of the examination as well as on all scrap paper.

Please feel free to direct any questions concerning the test to Mrs. Jan McDonald, SUNYA, 457-8255.

Thank you.

NAME_____

TO THE CANDIDATE:

Answer each of the following questions to the best of your ability on this paper.

You may use pen or pencil.

If there are problems which you do not understand, you should still try your best to answer them.

You may wish to do your work on scrap paper and transfer your final answers to this paper.

On this test, the symbol ^ will be used for an exponent. On your computer it may appear as an ↑ or ** or [or some other symbol. For example, if you see B^3, it means B*B*B.

DIRECTIONS (I-IV):

The listings for four programs appear below. To the right of each program, write what would appear on the screen or paper (including error messages, if any) after you type in the program and then type RUN.

I.

```
PROGRAM                                    OUTPUT

  4     X = 2
  5     X = 7
 10     PRINT  X;Y, X ^ 2
 20     PRINT  5
 30     PRINT "HELLO";
 40     PRINT  3*4
 50     PRINT  "3*4"
 63     PRINT
 75     PRINT  "GOOD","BYE"
 80     PRINT  X/2
999     END
```

NAME _____

II. PROGRAM OUTPUT

```
 5   REM  I AM A COMPUTER
10   M = 5
20   M = M + 1
25   PRINT  3*M
30   IF M = 9 THEN  END
40   GOTO 20
```

III. PROGRAM OUTPUT

```
 5   FOR I = 1 TO 6
10   PRINT  6 * I
20   NEXT I
30   END
```

NAME _____

IV. PROGRAM OUTPUT

```
 7    I = 1
10    READ  A,B
20    PRINT  I,A,B
30    IF I < 5 THEN GOTO 10
35    I = I + 1
40    DATA 2,4,6,8,10,3,5
50    DATA 9,7,16,28,14,15,12
60    END
```

NAME_____

V. DIRECTIONS:

For this program, in addition to listing the output, you will be showing us something about the memory of the computer. The boxes to the right below represent memory locations in your computer. The name of each memory location is in the upper left-hand corner of each box.

Pretend that you are the computer and 'RUN' the following program. List the OUTPUT as it would appear. Then fill in the boxes with the final values which would be stored in each of the memory locations at the end of the program.

PROGRAM

```
10   M = 2
20   A = 1
30   B = 2 * 3
40   C = A + B
50   LET C = C + 1
60   X = B/(C-5)
70   PRINT C * 4
80   M = M * B
90 LET F = B + X + C
92   R = B ^ 2
94   A = A - 1
96   Q = B
98   PRINT A;B;Q;F ;M;X;R;C
99   END
```

MEMORY AT THE END OF THE PROGRAM

A	B	Q	F
M	X	R	C

OUTPUT

NAME_____

VI. DIRECTIONS:

Knowing that there are 365 days in a year (ignoring leap years), 24 hours in a day, and 60 minutes in an hour, WRITE A PROGRAM which will ask for a person's age and will then calculate and print out the number of days, hours and minutes that the person had lived as of their last birthday.

A sample printout of the program's output is below:

```
WHAT IS YOUR AGE? 12

YOU HAVE LIVED 4380 DAYS.
YOU HAVE LIVED 105120 HOURS.
YOU HAVE LIVED 3607200 MINUTES.
```

Write the program below. If you need more room, use the back of this page.

NAME_____

VII: DIRECTIONS:

Without changing the basic format of the program which you have just written, describe some things that you might add to the program to make it nicer. These changes might involve more INPUT or more and different kinds of OUTPUT or possibly better ways to program what you put down before. Do not rewrite the whole program below, just list any additions that you might make, why you would make them, and the BASIC program lines that would be added.

APPENDIX D

SUMMER INSTITUTE MATERIALS

Math/Science Institute

for the Gifted

Some Procedures and Policies

A. Equipment

Although some partcipants will be bringing their own microcomputers to the Institute, many will be using equipment borrowed from others. It is extremely important to treat this equipment properly at all times. Please observe the following rules:

1. Do not move equipment around within room B 13.
2. Do not remove equipment from room B 13 (unless it is owned by the user).
3. All systems should be turned off when not in use.
4. No food or beverages will be permitted in room B 13.

B. Daily Time Schedule

8:30	Room B 13 will be open and available for use.
9:00 - 11:30	Morning instructional session - will begin promptly at 9:00!
11:30 - 12:30	Lunch and Problem Solving Experiments Most days this hour will be divided between time for lunch and partcipation by students in ongoing research being conducted by university faculty. Room B 13 will be closed during this hour every day.
12:30 - 3:00	Afternoon instructional session - will end promptly at 3:00!
3:00	Parents pick up Institute partcipants.

C. Other

1. Partcipants will each be issued a folder for storing hand-out materials, hard copies of program listings, etc. Because note-taking will be expected, it is important that participants be equipped with a notebook and writing materials.

2. Cross training on different types of microcomputer systems will be encouraged during the Institute.

3. Each partcipant will be issued a blank diskette or cassette at the beginning of the Institute. These will be used to store programs distributed by the Institute staff for instructional purposes or developed by Institute partcipants. Additional diskettes or cassettes may be needed and will be available for sale to Institute participants (diskettes - $2.50 each; cassettes - $2.00 each).
   No other diskettes or cassettes should be brought to the Institute!

SUNYA/CASDA

Math/Science Microcomputer Institute

An Overview of the Two-week Experience*

Monday, Aug. 2 - Tuesday, Aug. 3	Review of BASIC terminology; Programming Techniques; Apple II Low Resolution Graphics; Directed Programming Problems (All Staff)
Wednesday, Aug. 4	Presentation on Palindromes; Perfect, Deficient, and Abundant Numbers; Recognition of Number Patterns; Theories (Miss Blake)
Thursday, Aug. 5	"Artificial Intelligence" (Videotape) Heuristic Programming, "Animals" (Mrs. Foster) Programming problems on Recovering Remainders and conversion to different number bases (Mr. Van Schaick) Discussion on Permutations (Mrs. Bosworth) String Manipulation (Dr. Kelly)
Friday, Aug. 6	Permutation Programming Problems (Mrs. Bosworth) "Life" - Introduction, Recognition of Patterns, Theories (Mrs. Dolgowich)
Monday, Aug. 9	Spirolaterals (Miss Yudikaitus) Introduction to Environmental Studies (Mrs. Bosworth)
Tuesday, Aug. 10	Random Numbers (Dr. Kelly) Decimal representation and Converging series (Mr. Van Schaick) Environmental Impact (Mrs. Bosworth)
Wednesday, Aug. 11	
Wednesday, Aug. 11	Artificial Intelligence, Hex-a-pawn (Mrs. Foster)
Thursday, Aug. 12	Happy and Friendly Numbers (Miss Blake)
Friday, Aug. 13	Students Finish Projects; Closing Ceremonies

* Each day students were given varying amounts of time for directed programming to complete and extend problems posed in various presentations made by teachers.

Dear Parent,

On Friday, August 13, 1982 we will be finishing up our Microcomputer Institute and we would very much like to have you join us at the University for some closing activities. First, we want you to see some of the work the children have been doing and learn more about the nature of the program in which they have participated. Then, we would like you to be in attendance at a small ceremony at which we will award certificates to Institute participants. Finally, we want each student and his or her invited guests to joun me, the teachers and other university officials at a Picnic. The schedule of events follows:

12:00 noon - 1:00 p.m.	Visit with students and learn about their projects in room B13 of the Education Building and the Assembly Hall in the Campus Center
1:00 p.m. - 1:30 p.m.	Closing Ceremonies (Assembly Hall)
1:30 p.m. - 2:30 p.m.	Picnic for students and invited guests
2:30 p.m. - 3:00 p.m.	Remove microcomputers from room B13 and Assembly Hall

We hope you will be able to join us on Friday. I and the teachers have enjoyed our days with the children and would enjoy talking with you on Friday.

Sincerely,

Dr. K.

Dr. Joseph R. Kelly, Director
Math/Science Microcomputer
Institute for Gifted Students

APPENDIX E

DATA COLLECTION INSTRUMENTS

Department of Teacher Education

State University of New York at Albany

July 30, 1982

Dear Parent (Guardian):

It has been brought to our attention that the permission form most of you returned earlier did not explicitly identify all the data we planned to examine in our research. We are most anxious that you, the parents or guardians, are fully informed of all aspects of this study of problem solving. This letter will briefly outline the kinds of data to be examined and again seek your permission for use of these data for research purposes.

Last spring you gave permission for the release of standardized test scores, classroom teacher grades and teacher rating scales on motivation and problem solving. These data, as well as the score on a paper/pencil test of computer prerequisites, were used to screen youngsters for admission. We would like to include these data in our study of the variables which affect problem solving.

In addition, during the institute (August 2 - August 13) the students will be videotaped as they work on problem solving tasks. Teachers will collect data on strategies used by students and complete rating scales on problem solving and motivation. These activities are part of the instructional activities planned by the teachers to be used in helping them assess the effectiveness of instruction. The researchers would like permission to include these data in our study.

Also, the measures listed on the check list you were sent in June will be included in our data base. These are individual problem solving tasks, group paper/pencil tests of language used in problem solving, group paper/pencil tests of cognitive skills and group paper/pencil tests of motivation.

In order that we may include data on your son or daughter, we must again seek your permission. Please accept our apologies for this additional request. We know you appreciate the long range potential benefits of a systematic study of the reasoning used by a group of highly talented youngsters.

Sincerely,

Margaret A. Farrell

Margaret A. Farrell
Professor (Mathematics Education)
for
The Research Team

Education 113, 1400 Washington Avenue, Albany, New York 12222, 518/457-7752

Please return this permission form, via your daughter or son, to Dr. Joseph Kelly, Director of the Gifted Children's Institute, on Monday, August 2, 1982.

I hereby give my permission for _____ to participate
(Student Name)
in the SUNY Albany research project in gifted education in mathematics and science and for use of data identified in the letter of July 30, 1982 by the research team.

_____
(Date)

Parent or
Guardian's
Name_____
(Please Print)

Parent or
Guardian's
Name_____
(Signature)

STATE UNIVERSITY OF NEW YORK AT ALBANY

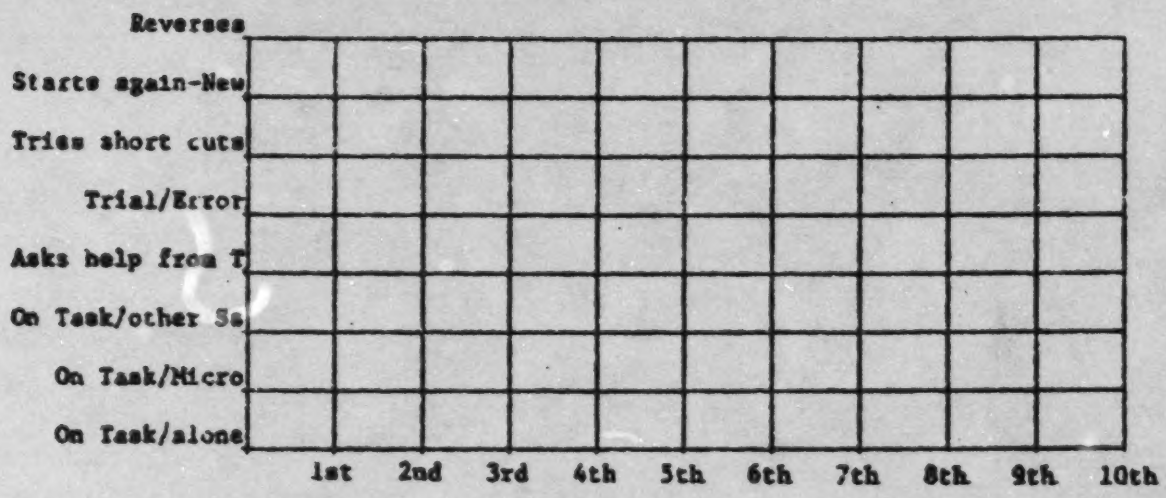
Department of Teacher Education

Summer Institute 1982 - Math/Sci - Micros/Gifted

Observation Scale

Student _____ Date _____ Time _____

Observer _____ Activity _____



Time in Minutes

Comments:

Guidelines for Anecdotal Forms

A. The following areas deserve recording.

Creativity (e.g. flexibility, fluency, originality)
Unusual and/or multiple problem-solving startegies
Systematic vs extreme random attempts
Generalizing steps
Very speedy but can't seem to abstract

Quality of Interaction
- Student to student questions, comments
- Comments, questions to teacher(s)
- On micro -- mode of operation
- Solo behavior

Evidence of persistence
Evidence of curiosity
Evidence of interest in "going beyond"

Structured group behavior
- Evidence of leadership
- Evidence of passive role
- Role in micro group (i.e. typist, programer, kibitzer)
- Does role change or stay the same?

Maturity
- Easily distra[illegible]d
- Responsibility
- Relation to adults

B. Make rough notes at the time as unobtrusively as possible. Later fill out an Anecdotal Form. Be careful to separate what you heard and/or saw from what you sensed or believe. The latter should appear in "evaluative comments." Be conservative in your critiques. Be redundant in "Observation," i.e. add scrap paper if relevant; indicate tape available, etc.

State University of New York at Albany
Department of Teacher Education
1982 Summer Institute - Math/Sci - Gifted/Micros

ANECDOTAL FORM

Student _____ Observer _____

Activity _____ Date _____ Time _____

1. Observation:
(Supporting Data? Tapes?...)

2. Evaluative Comments:

CASDA/SUNYA INTEREST SURVEY

Name_____

Directions: Please answer each of the following questions about the way that you work with computers. THERE ARE NO RIGHT OR WRONG ANSWERS.

	hardly ever	sometimes	often	almost always
1. I like to				
... write my own programs	1	2	3	4
... run programs that other people have written	1	2	3	4
... fix programs that other people have written	1	2	3	4
... type in and run programs that I find in books and magazines	1	2	3	4
2. When I write programs I like to work				
... alone	1	2	3	4
... with other people	1	2	3	4
3. If I have to work with other people, I like to work with				
... someone of my own sex	1	2	3	4
... someone of the other sex	1	2	3	4
4. If I need help when I'm writing a program, I				
... look it up in a manual or other book	1	2	3	4
... ask a friend for help	1	2	3	4
... ask a teacher or some other adult for help	1	2	3	4
... keep working on it alone	1	2	3	4
... forget it and give up	1	2	3	4
5. I like to				
... read books about computers	1	2	3	4
... read books not about computers	1	2	3	4

	hardly ever	sometimes	often	almost always
6. I like to write programs to				
... help me with my homework at school	1	2	3	4
... solve math and science problems as we've done in the institute	1	2	3	4
... solve problems that I make up myself	1	2	3	4
... help me learn more about how the computer works	1	2	3	4
7. If my program doesn't work it's because				
... I typed it wrong, but had it correct on paper	1	2	3	4
... I didn't know the correct BASIC coding	1	2	3	4
... my program ran but it doesn't do what it is supposed to do	1	2	3	4
... my program just won't run	1	2	3	4
8. When I work with a group of kids on a program, I				
... do the typing	1	2	3	4
... do the coding	1	2	3	4
... fix the errors	1	2	3	4
... just watch	1	2	3	4
... help organize	1	2	3	4
9. The best program is				
... a short program (in number of lines)	1	2	3	4
... a fast program (in how quickly it works)	1	2	3	4
... a program that works	1	2	3	4
... a program that uses a different approach from everyone elses	1	2	3	4

	hardly ever	sometimes	often	almost always
10. I like to				
... play computer games like pacman and space invaders	1	2	3	4
... play adventure games like dungeons and dragons	1	2	3	4
... write my own computer games	1	2	3	4
... play games like computer chess, mastermind, Nim or tic-tac-toe	1	2	3	4
... play non-computer games	1	2	3	4
... play sports like soccer or softball, etc.	1	2	3	4
11. When I get a program to work I like to				
... keep working on it to make it even better	1	2	3	4
... revise it to see if I can do the same thing a different way	1	2	3	4
... revise it to see if I can make it do more of the same kind of things	1	2	3	4
... leave it the way it is	1	2	3	4
12. If I have a math or science problem to solve, I				
... ask a teacher or friend	1	2	3	4
... write a computer program to figure out the answer	1	2	3	4
... look it up in a book	1	2	3	4
... figure out the answer by myself, without a computer	1	2	3	4
13. During the institute, when I was given a problem to solve, I				
...worked out a little in my head, typed it into the computer, then added whatever else it needed after I ran it	1	2	3	4
...worked out the whole thing in my head first, then wrote the whole thing on paper, then typed it in	1	2	3	4
...wrote out a little on paper, then typed it in, and then added whatever else it needed after I ran it	1	2	3	4
...worked it all out in my head first and typed it right into the computer	1	2	3	4

	hardly ever	sometimes	often	almost always
14. When we were given a problem to solve in the institute, it really helped when				
... I tried it with numbers on paper or on graph paper first	1	2	3	4
... the teachers gave us hints before we started to work	1	2	3	4
... the teachers gave me a couple hints while I was working at my station	1	2	3	4
... I was left alone to do the whole thing myself	1	2	3	4
15. When we were asked to look for patterns and develop theories, I				
... noted all of the data on paper and analyzed	1	2	3	4
... tried to remember data in my head, then analyze	1	2	3	4
... noted some data on paper, analyzed it, then tried specific data to test a theory	1	2	3	4
... didn't really look for patterns, I just ran through the program a while	1	2	3	4
16. Before I write a program to solve a problem, I try to				
... make a good guess about the answer	1	2	3	4
... find a general rule	1	2	3	4
... work out the entire answer by hand	1	2	3	4
17. During the institute I				
... helped others correct their mistakes	1	2	3	4
... needed help from others to help find my mistakes	1	2	3	4
18. When I write a program				
... I am sure that it is going to work	1	2	3	4
... I believe that it will be easier than by doing the same thing by hand	1	2	3	4
... I have fun	1	2	3	4

SUNYA/CASDA SUMMER MICROCOMPUTER INSTITUTE
Interest and Evaluation Form

Please complete each of the following sentences:

1. The thing that I find the most fun about working with computers is

2. The thing that I find the easiest about working with computers is

3. The thing that I find the most difficult about working with computers is

4. Computers are good for solving problems because

5. Computers are <u>not</u> good for solving problems when

6. The thing that I liked the most about the Institute was

7. The thing that I liked least about the Institute was

8. I think the following things should be changed in the Institute